



U.S. Department of Energy

Energy Efficiency and Renewable Energy

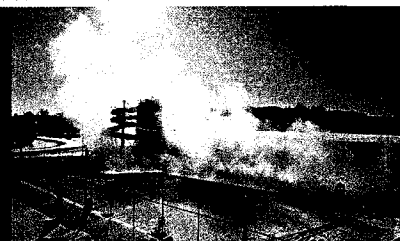
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

EXHIBIT 1

DATE 1/22/07

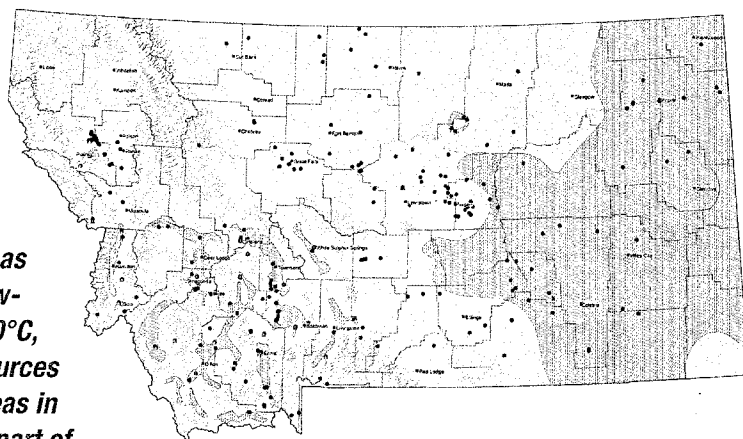
NO. 6,8

Geothermal Technologies Program Montana



(Credit: Fairmount Hot Springs Resort PIX14300)

Although many areas of Montana may have high enough temperatures at depth to support geothermal power generation, geothermal development in the state has thus far been limited to low-temperature (less than 100°C, or 212°F) geothermal resources near the surface. Many areas in the mountainous western part of Montana have been found to have such near-surface resources and the



Idaho National Laboratory <http://geothermal.id.doe.gov/maps-software.shtml>

eastern third of the state has abundant deeper geothermal aquifers. Hot water from such low-temperature geothermal resources can be used directly to heat buildings, grow plants in greenhouses, or heat water for aquaculture. Nearly 20 hot springs resorts and public bathing facilities in the state take advantage of this resource, many also using it for space heating.

Current Development

Nearly 20 public or commercial recreational facilities have been built around Montana hot springs, some of them quite substantial. The Fairmont Hot Springs Resort has 152 rooms and the Chico Hot Springs Resort a total of 80 rooms and cabins. Many of the spas use the geothermal water for space heating as well. Reestablishment of space heating for the Warm Springs State Hospital is also being investigated. Geothermal heat pumps are common in the state.

Potential Development

One private company is currently exploring the feasibility of installing a small binary power system near one of the state's existing spas. Power would be used by the resort and sold to the utility under a net-metering program. Binary systems use geothermal water to heat a secondary, lower-boiling-point fluid. Such closed-loop systems can operate from lower-temperature resources and avoid

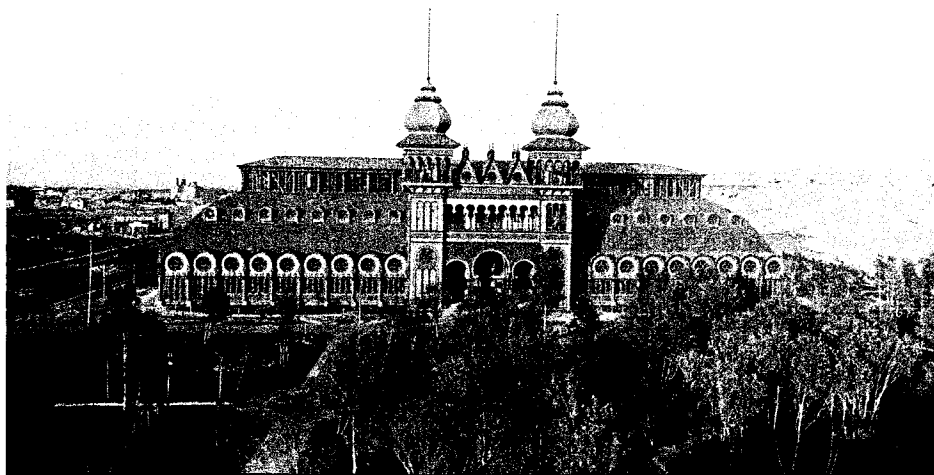
environmental impacts of air emissions and released geothermal water.

A second company is tapping geothermal heat from the approximately 50°C (122°F) waters in the pit lake of the former Anaconda copper mine complex in Butte. While some of that heat may come from chemical reactions in the large Superfund site, mine shafts ran more than a mile (5,280 ft or 1,610 m) deep and former miners reported that many of the tunnels were unbearably hot, so most is likely geothermal. Water/antifreeze transfer fluid will be pumped to a heat exchanger in one of the shafts and back to the surface to radiators or heat exchangers in a former shop building at the mine. No supplemental heat will be needed though the 4,400-square-foot building is largely glass and local winter temperatures can drop as low as -40°C (-40°F). Both of these projects are partially funded by 2005 grants from NorthWestern Energy under Montana's Universal Systems Benefit Fund described below.

The 152-room Fairmont Hot Springs Resort is the largest of several major hot springs resorts in Montana. This is the fifth hotel built at the springs since 1869, demonstrating the enduring attraction of mineral hot springs.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



The Broadwater Natatorium, near Helena, 1890. The grand natatorium with its 91-m x 30-m (300-ft x 100-ft) bathing pool operated from 1889 to 1935 when it was severely damaged by an earthquake. The equally grand hotel that accompanied it operated for about the same period.

Credit: E. Jay Haynes, Courtesy of Montana Historical Society (PIX 14299)

A "Collocated Resources Study" by the Geo-Heat Center identified eighteen communities in Montana within 8 km (5 miles) of a geothermal resource with a temperature of at least 50°C (122°F), making them good candidates for district heating or other direct geothermal uses.

Policy

Montana's recently (2005) enacted renewable portfolio standard requires public utilities to generate 5% of their power from renewable energy, including geothermal power, by 2008; 10% by 2010; and 15% by 2015. Montana has several other policies and programs to encourage geothermal projects. Notably, building renewable energy projects is among purposes eligible for grants from a Universal Systems Benefit Fund collected by the state's largest utility. With GeoPowering-the-West funding, the state Department of Environmental Quality has contracted a consulting company to compile and update geothermal resource data and identify opportunities for development. This study should be completed by the end of 2006.

Montana also has a revolving loan program funded by air quality violation fines, which is available for small alternative energy projects. Geothermal and other renewable energy facilities up to 1 MW are exempt from corporate property tax for their first five years of operation. Larger facilities are eligible for either reduced property tax assessment or a 35% corporate tax credit. Montana

offers a personal income tax credit of up to \$1,500 for installation of geothermal heat pumps for principal residences plus a property tax exemption for the systems.

History

Many Native Americans in Montana historically wintered at hot springs, believing strongly in the healing benefits of the warm mineral water. Lewis and Clark visited Lolo Hot Springs west of Missoula on their way west in 1805. Clark visited what is now Jackson Hot Springs in Southwest Montana on the way back east in 1806. Early trappers, miners, and others sought out hot springs to soak themselves and their clothes. The gold rush years of the 1860s saw hot springs hotels and bathhouses built near Chico, Virginia City, Boulder, Clancy, and Helena to serve the miners. The early railroad days of the 1890s to the 1920s brought major luxury hotels at Hunter's, Chico, Corwin, and Broadwater hot springs. Prohibition, several fires, and even an earthquake led to their various demises and the renewed popularity of hot springs resorts of today generally developed only in the last twenty years. While some Montanans today may go a little farther south when they need a break from winter, many others continue the tradition of taking the waters with visits to one of the state's many hot spring spas. (For more history and for information on current resorts, see the book *Touring Montana and Wyoming Hot Springs* by Jeff Birkby.)



GEOPOWERING THE WEST

GeoPowering the West is a cooperative federal, state, and local effort to promote awareness of the vast geothermal energy resources in the western United States, including Alaska and Hawaii. GeoPowering the West partners with businesses, government officials, Native American groups, utilities, and energy consumers to expand the use of geothermal energy.

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Montana Bureau of Mines and Geology

www.mbm.bmg.mtech.edu/search_1.asp?type=keyw

Geo-Heat Center - Direct-Use Technical Info.

(541) 885-1750
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